

[0068]What is claimed is:

1. A communication system, comprising:

a first communication module adapted to: receive a first type of communication signal, convert the first type of communication signal to a second type of communication signal and transmit the second type of communication signal to a second communication module;

the second communication module disposed on a building and adapted to receive the second type of communication signal from the first communication module, and transmit the second type of communication signal inside the building to a third communication module; and

the third communication module located inside the building and adapted to receive the second type of communication signal, convert the second type of communication signal into the first type of communication signal, and transmit the first type of communication signal.

2. The system of claim 1, wherein:

the third communication module is configured to:
receive the first type of communication signal;
convert the first type of communication signal into the second type of communication signal; and

transmit the second type of communication signal to the second communication module;

the second communication module is configured to:
receive the second type of communication signal from the third communication module; and transmit the second type of communication signal to the first communication module; and

the first communication module is configured to:
receive the second type of communication signal;

convert the second type of communication signal to the first type of communication signal; and
transmit the first type of communication signal.

3. The system of claim 2, wherein:

the third communication module comprises communication processing circuitry that is configured to validate the second type of communication signal; and

the third communication module only transmits the type of communication signal if the second type of communication signal is validated by the communication processing circuitry.

4. The system of claim 2, wherein the first type of communication signal is one of:

a mobile communication signal; and
a legacy wireless communication signal.

5. The system of claim 2, wherein the first type of communication signal is carried over least one of:

an approximately 400 MHz frequency band;
an approximately 800 MHz frequency band;
an approximately 900 MHz band;
an approximately 1800 MHz band; and
an approximately 2 GHz frequency band.

6. The system of claim 2, wherein the second type of communication signal is a millimeter wave signal.

7. The system of claim 2, wherein the second type of communication signal is mounted inside a window of the building.

8. The system of claim 1, wherein the second communication module is mounted outside a window of the building.
9. The system of claim 1, wherein the second communication module is mounted inside a window of the building.
10. The system of claim 1, wherein:
the second communication module comprises at least one antenna that is a low to moderate gain array antenna.
11. The system of claim 10, wherein the low to moderate gain array antennas comprise interconnected beam-forming array patterns on both the outward and the inward facing sides, separated by an intervening ground plane.
12. The system of claim 1, wherein:
the first communication module comprises communication processing circuitry that is configured to validate the first type of communication signal; and
the first communication module only transmits the second type of communication signal if the first type of communication signal is validated by the communication processing circuitry.
13. The system of claim 12, wherein the communication processing circuitry validates the first type of communication signal if the first type of communication signal is an emergency telephone called placed or received by emergency personnel.
14. The system of claim 1, wherein the first communication module is mounted on top of a vehicle.

15. The system of claim 1, wherein the first communication module is mounted to a structure at ground level.

16. The system of claim 1, wherein the first communication module is mounted to an elevated structure.

17. The system of claim 1, wherein the first communication module comprises an antenna, wherein the antenna is a high gain fan beam antenna.

18. The system of claim 1, wherein the system is configured for floor-to-floor communication.

19. The system of claim 1, comprising a fourth communication module and a fifth communication module, wherein:
the third communication module is configured to:
receive a third communication signal;
convert the third communication signal into a third millimeter wave radio signal; and
transmit the third millimeter wave radio signal to the second communication module;
the second communication module is configured to:
receive the third millimeter wave radio signal;
transmit the third millimeter wave radio signal to the fourth communication module;
the fourth communication module is mounted to the side of the building at a different elevation than the second communication module and is configured to:
receive the third millimeter wave radio signal from the second communication module; and

transmit the third millimeter wave radio signal to the fifth communication module; and
the fifth communication module is located inside the building at a different elevation than the third communication module and is configured to:
receive the third millimeter wave radio signal;
convert the third millimeter wave radio signal into the third communication signal; and
transmit the third communication signal.

20. A communication system as recited in claim 1, wherein the first communication signal is adapted to up-convert the first type of signal to the second type of signal.

21. A communication system as recited in claim 1, wherein the first communication signal is adapted to down-convert the first type of signal to the second type of signal.

22. A communication system as recited in claim 1, wherein the second communication module is on the top of the building.

23. An apparatus comprising a communication module mountable to the side of a building and the communication module is configured to:

receive a radio signal, originating from an elevation different than the communication module;
transmit the radio signal into the building.

24. The apparatus of claim 23, wherein the radio signal carries at least one of an up-converted mobile communication

signal, an up-converted legacy wireless communication signal, and a millimeter wave radio signal.

25. A method comprising:

receiving a radio signal at a communication module, wherein the communication module is mounted to the side of a building, wherein the radio signal originated from an elevation different than the communication module; and transmitting the radio signal into the building.

26. The method of claim 25, wherein the radio signal carries at least one of an up-converted mobile communication signal, an up-converted legacy wireless communication signal, and a millimeter wave radio signal.

27. The method of claim 25, wherein the radio signal carries at least one of an up-converted mobile communication signal, an down-converted legacy wireless communication signal, and a millimeter wave radio signal.